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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/543,031	07/21/2005	Thanasis Loupas	US030029 US	8976

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EXAMINER	
CWERN, JONATHAN	
ART UNIT	PAPER NUMBER
3737	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/543,031	LOUPAS, THANASIS	
	Examiner	Art Unit	
	Jonathan G. Cwern	3737	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *25 November 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17 and 19-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17 and 19-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application.
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

Claims 1-5 are objected to because of the following informalities:

In claim 1, lines 7-8 the phrase "a plurality of images" should be changed to "the plurality of images" in light of the recent amendment to include "a plurality of images" in line 3.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 6-10 and 13-14 are rejected under 35 U.S.C. 102(b) as being anticipated by Goujon (US 5941826).

Goujon shows a method for displaying the distribution of a motion characteristic occurring at a region of interest in a two or three dimensional ultrasound image of the body comprising (column 4, lines 5-15): acquiring a sequence of spatially dimensioned ultrasound images in which a motion characteristic is displayed (column 6, lines 10-60); delineating a region of interest (ROI) in one of the images where motion is present in the image (column 7, lines 30-40); processing the motion data from image points of the delineated ROI to determine the distribution of a motion characteristic as a function of time (column 6, lines 10-60); and displaying the distribution of the motion characteristic

as a function of time (column 6, lines 10-60). Also, the images are color images and can be stored in a buffer (the memory is a buffer, column 6, lines 10-60); displaying an image of the ROI where the spectrogram is concurrently displayed and a columnar display element for displaying the distribution of the motion characteristic (column 13, lines 35-55, and Figure 8); wherein the motion comprises blood flow velocity (distribution of speed and blood flow rate, column 4, lines 5-15); wherein the motion comprises tissue motion velocity (displacement of vessel walls, column 4, lines 5-15); wherein the motion comprises blood flow velocity derivatives (the amount of blood present is calculated over a change in time, this can be interpreted to be calculating blood flow velocity derivatives, the change in the amount of blood in a particular segment of the vessel over the change in time, column 6, lines 10-60); delineating a plurality of pixels in the images (user selects a vessel of interest to be segmented (delineated), the vessel will comprises a plurality of pixels, column 7, lines 25-40).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Goujon (US 5941826) in view of Guracar et al. (US 6464640).

Goujon shows a method for displaying the distribution of a motion characteristic occurring at a region of interest in a two or three dimensional ultrasound image of the body comprising (column 4, lines 5-15): acquiring a sequence of spatially dimensioned ultrasound images in which a motion characteristic is displayed (column 6, lines 10-60); delineating a region of interest (ROI) in one of the images where motion is present in the image (column 7, lines 30-40); processing the motion data from image points of the delineated ROI to determine the distribution of a motion characteristic as a function of time (column 6, lines 10-60); and displaying the distribution of the motion characteristic as a function of time (column 6, lines 10-60); displaying a spectrogram (the histogram is called a Doppler spectrum, column 6, lines 10-60). Also, the images are color images and can be stored in a buffer (the memory is a buffer, column 6, lines 10-60); displaying an image of the ROI where the spectrogram is concurrently displayed (column 13, lines 35-55, and Figure 8); wherein the motion comprises blood flow velocity (distribution of speed and blood flow rate, column 4, lines 5-15); wherein the motion comprises tissue motion velocity (displacement of vessel walls, column 4, lines 5-15); wherein the motion comprises blood flow velocity derivatives (the amount of blood present is calculated over a change in time, this can be interpreted to be calculating blood flow velocity derivatives, the change in the amount of blood in a particular segment of the vessel over the change in time, column 6, lines 10-60); delineating a plurality of pixels in the images (user selects a vessel of interest to be segmented (delineated), the vessel will comprises a plurality of pixels, column 7, lines 25-40).

Guracar et al. disclose methods and apparatus for ultrasound imaging with automatic color image positioning. Guracar et al. teach that histograms can be formed from Doppler signals from multiple spatial locations in a region of interest (column 3, lines 15-25 and column 13, line 54-column 15, line 60).

It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to have applied the system of Goujon over multiple spatial locations as taught by Guracar et al. in order to evaluate a larger segment of the blood vessel, and to obtain additional useful data regarding blood flow. Applying Doppler pulses over multiple spatial locations as opposed to a single location is a well known expedient in the art and it would be obvious for one of ordinary skill in the art to do so when obtaining data regarding blood flow in a vessel. Obtaining data over a region rather than from a single point yields additional useful data regarding the region. In the specific case of blood flow in a blood vessel, applying pulses over a region can aid in locating where a stenosis may be formed, or may aid in calculating specific values related to the blood flow such as blood flow rate, speed, velocity, etc.

Claims 15-17 and 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Goujon (US 5941826) in view of Guracar et al. (US 6464640) and Mo et al. (US 6142943).

Goujon shows a method for displaying the distribution of a motion characteristic occurring at a region of interest in a two or three dimensional ultrasound image of the body comprising (column 4, lines 5-15): acquiring a sequence of spatially dimensioned

ultrasound images in which a motion characteristic is displayed (column 6, lines 10-60); delineating a region of interest (ROI) in one of the images where motion is present in the image (column 7, lines 30-40); processing the motion data from image points of the delineated ROI to determine the distribution of a motion characteristic as a function of time (column 6, lines 10-60); and displaying the distribution of the motion characteristic as a function of time (column 6, lines 10-60); displaying a spectrogram (the histogram is called a Doppler spectrum, column 6, lines 10-60). Also, the images are color images and can be stored in a buffer (the memory is a buffer, column 6, lines 10-60); displaying an image of the ROI where the spectrogram is concurrently displayed (column 13, lines 35-55, and Figure 8); wherein the motion comprises blood flow velocity (distribution of speed and blood flow rate, column 4, lines 5-15); wherein the motion comprises tissue motion velocity (displacement of vessel walls, column 4, lines 5-15); wherein the motion comprises blood flow velocity derivatives (the amount of blood present is calculated over a change in time, this can be interpreted to be calculating blood flow velocity derivatives, the change in the amount of blood in a particular segment of the vessel over the change in time, column 6, lines 10-60); delineating a plurality of pixels in the images (user selects a vessel of interest to be segmented (delineated), the vessel will comprises a plurality of pixels, column 7, lines 25-40).

Guracar et al. disclose methods and apparatus for ultrasound imaging with automatic color image positioning. Guracar et al. teach that histograms can be formed from Doppler signals from multiple spatial locations in a region of interest (column 3, lines 15-25 and column 13, line 54-column 15, line 60).

It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to have applied the system of Goujon over multiple spatial locations as taught by Guracar et al. in order to evaluate a larger segment of the blood vessel, and to obtain additional useful data regarding blood flow. Applying Doppler pulses over multiple spatial locations as opposed to a single location is a well known expedient in the art and it would be obvious for one of ordinary skill in the art to do so when obtaining data regarding blood flow in a vessel. Obtaining data over a region rather than from a single point yields additional useful data regarding the region. In the specific case of blood flow in a blood vessel, applying pulses over a region can aid in locating where a stenosis may be formed, or may aid in calculating specific values related to the blood flow such as blood flow rate, speed, velocity, etc.

Goujon fails to specifically mention the use of a beamformer coupled to the ultrasound probe.

Mo et al. disclose a Doppler ultrasound automatic spectrum optimization technique. Mo et al. teach a beamformer connected to the probe (column 3, lines 30-45, and Figure 1).

It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to have had a beamformer connected to the ultrasound probe as taught by Mo, in the device of Goujon, as a beamformer is a common element found in an ultrasound system to receive the return signals.

Response to Arguments

Applicant's arguments filed 11/30/09 have been fully considered but they are not persuasive.

In regards to applicant's arguments regarding the 102(b) rejection of claim 6, examiner respectfully disagrees. The claim is broad enough to read on merely the Color Speed Mapping approach described by Goujon in column 6, lines 10-33. For example, the claim contains no mention of using histograms.

Applicant's arguments in regards to the 102(b) rejection of claim 1 are persuasive and the 102(b) rejection regarding claim 1 and its dependent claims has been withdrawn.

In regards to applicant's arguments regarding the Guracar reference, examiner respectfully disagrees. As stated in the rejection by the examiner, applying Doppler pulses over multiple spatial locations as opposed to a single location is a well known expedient in the art and it would be obvious for one of ordinary skill in the art to do so when obtaining data regarding blood flow in a vessel. The Guracar reference illustrates this point. The Guracar reference is in the same field of endeavor as they are also discussing ultrasound specifically in relation to color Doppler and spectral Doppler (column 1, lines 24-35). In column 3, Guracar et al. refer to acquiring Doppler data over multiple spatial locations and forming histograms of the data. Also, as stated in column 10, lines 35-49, a region of interest including multiple spatial locations can be selected, or a single point if desired. Thus, in combination with Goujon, one of ordinary skill in the

art would obtain histograms of the data over an area rather than a single point, to yield information regarding flow dynamics.

In general, the examiner recognizes the differences between the prior art and applicant's invention, however the examiner believes that the claims are still too broad to sufficiently distinguish between the two. Applicant gives an excellent explanation on pages 7-8 of the differences between the present invention and the prior art, however the examiner finds that all the information contained therein is not found necessarily in the independent claims. For example, applicant refers to colorflow images throughout the discussion, however this term is not found in the independent claims. Also, applicant writes "Histograms formed in this manner from successive images are then use to form the spectral lines of a Doppler spectogram display". The terminology in the claim however is broader, and only refers to mapping the histograms to "display elements", and displaying the display elements as a spectogram. Claim 6 contains no mention of histograms.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan G. Cwern whose telephone number is (571)270-1560. The examiner can normally be reached on Monday through Friday 9:30AM - 6:00PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Casler can be reached on 571-272-4956. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jonathan G Cwern/
Examiner, Art Unit 3737

/BRIAN CASLER/
Supervisory Patent Examiner, Art Unit 3737